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DEVELOPING OPEN SOURCE SYSTEM EXPERTISE IN EUROPE (DOSSEE)

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ABSTRACT

Developing Open Source System Expertise in Europe (DOSSEE) is an Erasmus intensive programme (IP). The aim of this IP is to exchange knowledge of and experience in local methods and techniques in the field of open source software knowledge in ICT by engaging a group of international students and lecturers in a joint, explorative investigation of contemporary methods of open source software systems. In addition the program focuses on the students learning interpersonal skills, such as personal and professional skills, multidisciplinary teamwork, communication, communication in a foreign language and leadership. The target group consists of European engineering students who are interested in knowing which factors play a role in information systems and what the similarities and differences between the various national approaches in open source software systems and techniques are. The event forms a unique opportunity in promoting active learning in an international environment. Students get experience working in teams across country boundaries. In the paper we will describe the structure and our experiences from participating in this IP with relation to the CDIO initiative. Finally we draw conclusions and give our recommendations based on those.

KEYWORDS

Communication, group dynamics, international team building, international design-build projects, interpersonal skills.

INTRODUCTION AND BACKGROUND

In the period 14 March 2011 to 24 March 2011, DTU participated in the Erasmus Intensive programme (IP) Developing Open Source System Expertise in Europe (DOSSEE)

The Erasmus IP is a short programme of study under the The European Commission's Lifelong Learning Programme. The aim of an IP is to bring together students and teaching staff from higher education institutions of at least three participating countries. It can last from 10 continuous full days to 6 weeks of subject related work.
The DOSSEE IP last for 10 days and involves the following partners: Helsinki Metropolia University of Applied Sciences (Metropolia), Finland, Universidad de Alcalá (UAH), Spain, Technical University of Kosice (TUKE), Slovakia, Transport and Telecommunication Institute

(TTI), Latvia, IUT1 Université Joseph Fourier Grenoble (IUT1 Grenoble), France, FH Joanneum University of Applied Sciences, Austria and Technical University of Denmark (DTU), Denmark.
A total of 70 students (10 students from each partner organization) and 20 teachers from the participating institutions met at this year's host institution. Universidad de Alcalá (UAH), Spain

Pedagogically the DOSSEE IP aims to:

- Develop and pilot new pedagogical approaches in project development in a multinational environment
- Promote experimental learning
    - learning to learn
    - how to deal with unknown methods and techniques
- Promote use of modern communications media in project management
    - web-based course material delivery
    - document management systems, i.e. version control systems and wiki's

The event fits extremely well with the CDIO principles and brings the ideas forward to an international scene.

PROCESS OVERVIEW

The DOSSEE development process consists of two parts, figure 1:

The development of a project plan and technical plan at the "Home University". This part is done by local students in each partner institution. The technical plan forms a "Design-Build" project to be conducted by an international team in the intensive period.
The intensive period. In this period the product is developed in international teams

The objective of the Danish project is to develop an audience response system (ARS) running on an Android based Smartphone.

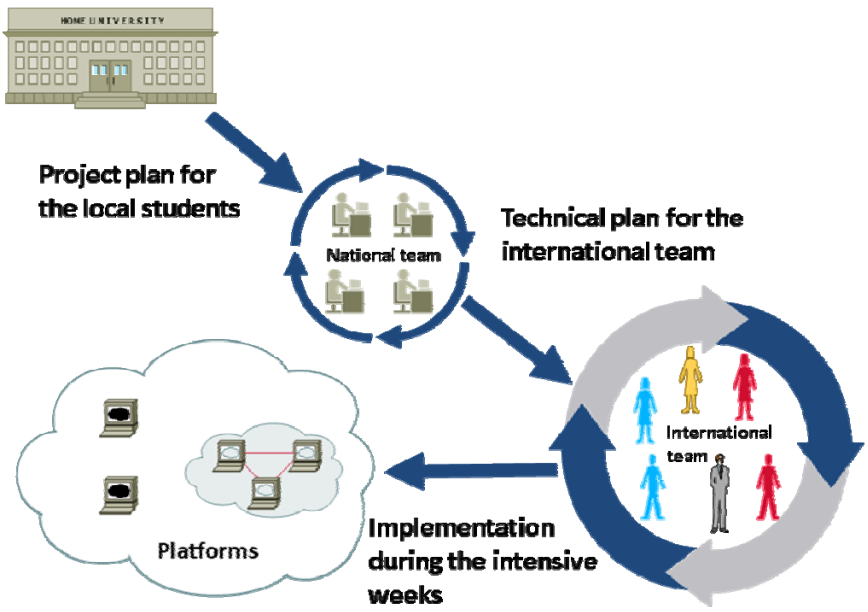

Figure 1. Overview of the development process

Before the start of the intensive period, students from each partner organization will be distributed to other partner projects, based on their technical skills, apart from the national project managers and their deputies, will be back in their respective projects.

By successfully completing the Intensive Programme, students can earn 5 ECTS credits. Besides work a social programme will be offered to all participants.
The overall process is shown in figure 1.

HOME UNIVERSITY ACTIVITIES

Project plan / idea

The idea to the project plan, came to us during an event in Copenhagen, where Apple/iPhone and the Internet Service Provider "3G", were promoting their products. During the event among different presentations – the audience were asked to vote using their SmartPhones. Unfortunately the bandwidth was to narrow – so a lot was unable to vote. Afterwards we were talking about having this tool to use in our lectures. It could be nice to test the student's knowledge on a subject before a lesson and again after – to measure the benefits for the students.
We tried to buy an app from Apple through App Store (http://store.apple.com/) – an app able to handle such Audience Vote Response – it was either not existing or too expensive. Then the idea evolved – why not ask our students to develop the Software on the Android Platform using e.g. a HTC SmartPhone?

We were a little bit exited about – how many students we could attract to both the idea behind the project plan but also the loss of 2 weeks lectures at the home university during the Intensive Period abroad? We tried to spread the information on posters like "Who would like to go to Sunny Spain for 2 weeks?" and by asking our colleagues to spread the offer both among Bachelor as well as among Master Students.

We succeeded very well, as 48 students wanted to go and we only had 10 seats.

Information meeting

The next step was to set up an information meeting – to make the conditions clear to everyone.
The conditions were: – "Are you ready to loose 2 weeks teaching / learning at the home university and cope with the lectures on your own before going or after coming home? Are you willing to deposit 150 € before Christmas?" The deposit covered the student's part of the flight ticket and social program in Spain.
We also informed the students around the importance of having a health- and a travel insurance – and the possibility for being moved from the Danish project to one of the partner Universities projects.
We set a limit to students that they should have studied at least one and a half year – before they were mature enough on ICT. All information was concurrently distributed on the website www.dtu20.be/DOSSEE which was set up as a service to the students.

Selection of students

To cut down the number of students from 48 to 10 – we made a questionnaire. This questionnaire made the students write about their motivations and personal skills as "How many different programming languages are you able to handle?" "How many different OS-platforms are you familiar with?" etc. Only 24 students were handing in the questionnaire

We then selected the 10 best fitted and also took out 2 reserves in order to secure against illness or other events. We made the 10 students pay 3 months before as a guarantee for being serious about going.

Preparing the technical plan

We then started up the 12 students on some meetings – where they started working on transforming the project plan to the technical plan. They began on this task around 1st of December 2010 and ended the job during February 2011. The technical plan contained the foundation for Design-Build project to be carried out in Spain. The technical plan was important as it should be used to secure a proper developing during the 2 intensive weeks in Spain – also the technical plan was marked as it contributed with a third to the grade for each of the Danish students.

Distributing the students into international teams according to skills (and wishes)

The coordinator in Finland made the distribution of students – except for the 2 team leaders, who were tight coupled to the home university's project and knowing the technical plan.
The coordinator was supported with the information on the student's skills – known from the questionnaires- The students were all informed on the other universities' plans and ideas – so we made them produce 2 prioritized wishes. Due to lack of students from France – 3 free seats were offered and as Denmark had a huge pool of students – we started to offer the 2 reserves the chance to join – and also in the last minute found yet another student willing to go to Spain. Thus in total 13 students from Denmark went to Spain.
The group flight ticket booked just around Christmas, had to be updated with the new members.

Establish contact to the international team members before the IP.

The different mixed teams were established around 2 weeks before departure – thus were informed on the other team member's email addresses – and thus the team leaders were able to start introducing themselves and start networking before the arrival in Spain.

THE INTENSIVE PERIOD (IP)

All students arrived to Alcala on Sunday just before the start of the IP. The hosting university was responsible for accommodation and arrangement of laboratory facilities and the necessary equipment. Before the IP, a questionnaire was filled regarding requirements for necessary technical equipment to carry out each partner's project.

An overview of daily schedule is shown in table 1.

The first day a number of practical information's were giving together with a general lecture on multicultural teamwork. Furthermore the students were informed about the grading process.

As part of the introduction event each of the 7 team leaders presented the technical plans of the projects to be developed in the international teams.

After the introduction presentations the international teams were gathered in laboratories that were assigned to each project.

Table 1
Overview of daily schedule

Day	Activities
1	- Welcome, general practical information - lecture on multicultural teamwork - lecture on grading and teamwork in the IP - Intercultural Ice-Breaker
2	- Teamwork workshop - Teams presenting their technical Plans - Introducing the technical environment - International Communication Workshop - Mentored International Teamwork
3	- Mentored International Teamwork - International Communication Workshop
4	- Mentored International Teamwork
5	- Mentored International Teamwork
Weekend	- Social arrangements
6	- Mentored International Teamwork
7	- Mentored International Teamwork
8	- Mentored International Teamwork - Preparation of project presentations
9	- Project presentations
10	- Project presentations and final evaluation

In Figure 2, the Danish-led international team is shown alongside with the team's mentors.

Figure 2. The Danish-led international team. From left to right: Mads Nyborg (Denmark, mentor), Juha Hakala (Finland), Kim Rostgaard Christensen (Denmark, project leader), Vera Fallmann (Latvia), Marcos Sanchez Blazquez (Spain), Jeppe Mariager (Denmark, deputy project leader), Ramón García Olivares (Spain), Tomáš Vereščák (Slovakia), Erik Telepovský (Slovakia), Alžbeta Kováčová (Slovakia), Jin Jin (Finland), Andres Rubio del Saz (Spain), Finn Gustafsson (Denmark, mentor)

During the first two days an international communication workshop for the individual teams was held. Before these workshops an intercultural Ice-Breaker event took place for all students. The purpose of the Ice-Breaker was to allow students to shake hands and get to know each other and thereby increasing group dynamic.

Based on the technical plan of the Danish project, the project was divided into three sub-projects within the team: server backend, native Android frontend and web frontend Team leaders formed subgroups based on a questionnaire in the team, where the student's wishes and detailed skills within the team were taken into account. The students had to deal with a number of technical challenges and were based on the technical to agree on what technologies should be used to develop the project.

The project was developed using a Scrum-like [5] development process. Every morning a status meeting was held where each subgroup presented their work so far and what they planned to do the following day. In figure 3, the Danish-led team is shown at work in the laboratory.

At the start of week 2 the integration of the individual subprojects were started and the test phase began hereafter.

On a daily basis a review / progress meeting was hosted by the teachers (team mentors) at the end of the day. Problems encountered were discussed with team leaders and potential solutions put forward.

Figure 3. Teamwork in laboratory – testing the Android front end

To support the project development a CMS system based on Redmine (http://www.redmine.org/) was created. The project team used the version control facility Redmine as a common base for controlling versions of the developed system.

COMMUNICATION WORKSHOPS DURING THE IP

The objectives of the IP course have not only been of a technical nature. After the first DOSSEE IP in Helsinki, Finland in March, 2010, one of the comments from the evaluation board was that there should be more focus on the interpersonal skills since the working conditions of the typical engineer nowadays will include many other fields than just the hardcore technical skills. Based on this it was decided to include an Intercultural Ice-Breaker and an International Communication Workshop in the DOSSEE IP in Alcalá, Spain, 2011 in order to support the overall goal of the IP.

The work with interpersonal skills consisted of two parts:

- Intercultural Ice-Breaker
- International Communication Workshop

On day one, Monday, all students attended a two-hour Intercultural Ice-Breaker with exercises made to get the students to know each other. Unfortunately, this two hour Intercultural Ice-Breaker with exercises made to get the students to know each other. Unfortunately this Ice-Breaker suffered from taking place in a public area with very bad acoustic conditions making it impossible to communicate well. A microphone would have made a great difference and made it possible to give instructions to the exercises in a good way. Several exercises went down rather badly due to problems in communication, but the final exercise “Speed dating” where the students were placed in two circles, one into the other, worked out really well. The students standing two and two face to face got to talk to each other for about two minutes whereupon the students in the outer circle moved to the left and now could talk to a new person for two minutes. Once the students had found out the principle (again problems with communication) they apparently found the exercise great. When we walked from student to student telling that the workshop was over and they could go home, many of them were so busy talking that they stayed for much longer. Also we saw that students having been forced to move kept talking to their former interlocutor thus making a group of four persons talking. Another group of six persons started when one person asked if he could sit down since he had a problem with his leg due to a football injury. Put together with another student he immediately talked about how he could not be standing up due to having played football. About ten minutes later a whole group of football interested students were sitting together discussing this sport. This is really an example of how students with the same hobby/interest get together very quickly if given the right possibilities.

Tuesday and Wednesday, the seven international teams were split up in three so that one third of the students took the two hours International Communication Workshop at the same time: Teams 1 & 2, teams 3 & 4 and teams 5, 6 & 7. This part of the course consisted of exercises with the focus on communication and body language, and took place in a nice room with appropriate facilities and size.

Several students responded that taking an entire team of students at the same time to the International Communication Workshop was not a good idea – it was better to take about one third of the team (since the course was done three times) and preferably let the team leaders decide which team members should go at which time. This would make it possible for the team to continue working all the time and perhaps the students at the communication course would actually be able to focus 100% on the communication part rather than be thinking of the work in the IT-class since they knew other team members were working on the project. Dividing the teams into thirds during the communication course will also give the team members the possibility to get to know somebody from all seven teams.

Figure 4. Students in an exercise at the International Communication Workshop.

Evaluation of IP DOSSEE 2011: Feedback questionnaire

Friday afternoon towards the end of the IP DOSSEE 2011, there was a one-hour electronic questionnaire where the students were asked 64 questions including five questions where the students had the possibility of additional personal comments. There were no direct questions concerning the Intercultural Ice-Breaker and the International Communication Workshop.

Based on the electronic evaluation, an internal 30-page document "IP DOSSEE 2011: Feedback questionnaire" has been written. The results from this evaluation have been compared to a
similar evaluation from the first DOSSEE IP in Helsinki, Finland in March, 2010. In table 2 the most important information has been shown, which can be linked to the Intercultural Ice-Breaker and the International Communication Workshop. The results are influenced by many other occurrences in the IP project; however they do give an indication of the outcome. There was no education in communication in 2010, but only in 2011 which is one of the major changes from 2010 to 2011. Based on this, few comments can be linked to table 2, which are to be taken only as an indication since there were no questions directly linked to the communication.

Table 2
IP Student Feedback Comparison 2010 and 2011

IP Student Feedback Comparison	**2010 %**	**2011 %**	**Relative improvement %**
Better language skills	76.1	**79.2**	4.1
New friends	87.3	**93.1**	6.6
Experience and knowledge of different cultures	78.9	**86.1**	9.1
Independence	29.6	**30.6**	3.3
Life experience	73.2	**84.7**	15.7

When the results from table 2 are studied and year 2010 and 2011 are compared, it can be seen that the feedback is much more positive in 2011 than in 2010 when there was no Intercultural Ice-Breaker and International Communication Workshop. *"Experience and knowledge of different cultures"* has made a relative improvement of 9.1% and *"Life*

experience" as much as 15.7%. Making "New friends" has increased relatively by 6.6%. Of course these data can only be taken as indications since many other things all together influence on the results. However, since there has not been made any questions directly linked to the communication, these indications will be the only numbers which can be used except from comments from students and observations from the Workshop.

Comments from students – IP DOSSEE 2011: Feedback questionnaire and e-mails

There are generally more negative comments in the IP DOSSEE 2011 feedback questionnaire than what we are used to from the one week International Communication Course (ICC) we do in Helsinki, Finland as part of the ICT (Information and Communication Technology) week [2] [4]. One of the reasons for this could be that in the IP DOSSEE 2011 all the students were forced to do the International Communication Workshop, and at the same time they were very stressed by the work they had to do on the project. In Helsinki people choose the International Communication Course, however some take the course just to get the credit. It is the impression at the ICC Helsinki that in the beginning of the week several students may be quite negative towards the way the course takes place with personal exercises, where the students have to involve themselves; but by the end of week they have gradually changed to a more positive attitude, since they realise how much they actually learn in the exercises. As part of ICC Helsinki we teach 17.5 hours compared to the 2+2 hours we had at IP DOSSEE 2011.

Two hours Intercultural Ice-Breaker exercises and two hours International Communication exercises are simply too short time for all the students to really get an understanding for communication and how they can learn by doing personal exercises. Many will also have personal barriers against doing exercises where they are to involve themselves. It can be expected that only some of the IT students may have a basic understanding beforehand and therefore are able to understand the importance of committing themselves.

In the following, three positive and three negative comments from the students have been selected. The comments have been taken from IP DOSSEE 2011: Feedback questionnaire and e-mails sent to Christensen. As it has been stated before, the numbers of negative comments outnumber the positive comments.

Comments from students – Positive

"I really appreciate the intention of the communication workshop because I've been missing this kind of things since I started my degree. I mean, I try to consider it like a suggestion, an encouragement which calls to the dialogue and the discussion, the imagination and even the needed freedom to face the fact that not only must we work with computers but with other humans, and we must do it in a proper way. Normally, those humans will be engineers and, very often, engineers think that they are three steps over the rest of the people. So I reckon that, probably, something interesting to add in the next editions would be precisely that, something that make students notice the lack and necessity of humility and at the same time, how to deal with that. Finally, I would like to say thank you for making this possible. Being during these two weeks with such amount of different people from different countries has been one of the most rewarding experiences in my life."

"The team work presentations and concepts given to us in them should be given as needed by the tutors in the tutored team work hours. The only presentation I would not get rid of was the international communication workshop. It was very interesting and useful as not only were we taught basic techniques for job interviews but also about body language."

"The work on the project itself was awesome. The international communication + parties = awesome. And I loved Christensen's with their psychological stuff."

Comments from students – Negative

"And I think students' don´t need so many Ice-Breaking activities. We are young and perfectly deal with communication issues between each other."

"OPEN SOURCE (JIRA is not OPEN SOURCE), not so much theoretical stuff, if you want to make a Social ICE-Breaking give us a bottle of alcohol and not some stupid teambuilding exercise with the Danish couple."

"No stupid presentations about teambuilding and communication."

EVALUATION AND GRADING

Upon successfully participation in the IP a student can earn 5 ECTS.

The evaluation of the projects was based on:

Deliverables:

For the project documentation a WIKI (http://www.mediawiki.org/) was set up. All teams have to upload material to this site. The teams are free to decide the structure of their particular entry on this wiki.

Project presentations:

During the last two days of the period the teams presented their projects for all teams during a 45 minute oral presentation session. The presentation included a short demonstration of the product developed and answering of questions

The final assessment consists of three parts:

- Assessment of the preliminary work at the home university. This part is done by the teachers in the home universities and is mostly based on an evaluation of the developed technical plan.
- Peer Evaluation of team members. All team members within a team assesses each other (including themselves)
- Team evaluation. Each team assesses the other teams (including their own team).

Grades are based on an overall assessment of these parts. Students are graded individually. Each part of the above listed evaluation points counts 1/3 of the final grade.

CONCLUSIONS AND FINAL REMARKS

In general our experience with the IP is very positive. The event contributes extremely well in training of the student's personal, interpersonal skills and teamwork.
Very few problems were encountered in the Danish team.
General feedback from the students gave rise to the following points to consider in future IP's:

Project proposal

It should be considered to let the students choose the subject for the project and not the teachers as were the case of this IP. The teachers' role should be to approve the proposal.

Team leader role

It should be clearly stated in the application questionnaire which functions the team leader role includes such that an applicant can indicate whether he or she would like to take on this role.
In this IP the team leader and deputy was selected by the teacher based on the work put in the development of the technical plan at DTU.

Matching of student expectations

Not all students had the same expectations to the IP. The purpose of the IP is twofold – it contains both a social dimension and a technical dimension. In future IP's it might be useful to agree on the focus before the work start.

The IP Communication Course

It is a challenge in only 2+2 hours to make a breakthrough in the IP DOSSEE 2011 regarding communication for all IT students. This amount of time is to be considered limited when discussing the importance of obtaining interpersonal skills since the students were much focused on their project. Studies from the one week ICC for IT students in Helsinki [4] have shown that it is necessary to work with the students for many hours in order to make the young people aware of the communication problems some of the students face. It may be a good idea to write an introduction note to the teachers and students that are to participate in the program, in order to give a better understanding of the importance of learning the interpersonal skills in the program. This might be one of the most important improvements, which should be made for the IP DOSSEE 2012 program. Since in Denmark there is a great interest for participating in the IP DOSSEE program, it is suggested to make a two face screening process of the students: Phase one will focus on the students´ technical skills and phase two will focus on the interpersonal skills.

Organization of Communication workshop

In the future the International Communication Workshop should be organized differently by only taking about one third of the team and preferably let the team leaders decide which team members should go at which time. This would make it possible for the team to continue working all the time. Dividing the teams into thirds during the communication course will also give the team members the possibility to get to know somebody from all seven teams.

Finally, there was a general desire to shorten the introductory sessions so that the development period could be increased.

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Biographical Information

Mads Nyborg is associate professor in software engineering at DTU informatics. He has several years of experience in teaching in software engineering and has governed industrial projects both as consultant and as supervisor for student projects. He was the main responsible for introducing the CDIO concept at the diploma education at DTU informatics. He was made the main responsible for the IP DOSSEE at DTU Informatics.

Finn Gustafsson is senior scientist in software engineering at DTU informatics. He is Msc in Computer Science from University of Copenhagen and Bsc in Mathematics. He has more than 20 years of experiences in teaching ICT at different universities e.g. IT-University in Copenhagen, Copenhagen Business School, Roskilde University, De Montfort University – Leicester and Copenhagen Business College. He was made the main responsible for the IP DOSSEE at DTU Informatics.

Jørgen Erik Christensen is Associate Professor at Department of Civil Engineering, Technical University of Denmark, and member of the CDIO implementation board at the department. From 1997 to 2001 he studied gestalt therapy with specialisation in communication at the Norwegian Institute for Gestalt. In 2009 he studied: “Pedagogical and Didactic Theory about University Education and Teaching” at the Danish Pedagogical University, Denmark.

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